

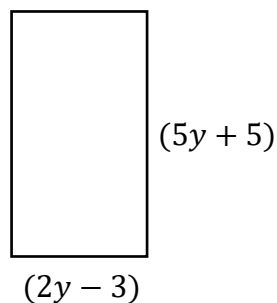
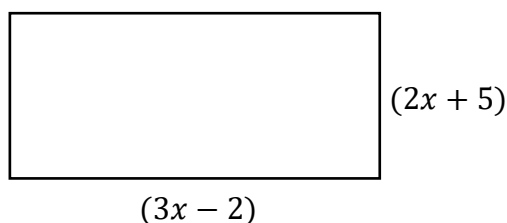
Permitted resources:

- FSA Approved calculator
- Algebra 1 FSA Reference Sheet

2016 – 2017 Algebra 1 Midterm Review

1. The expression $13x + 5$ represents the number of marbles you have after purchasing 13 bags of marbles.
 - a. What does the term $13x$ represent?
 - b. What does 5 represent?
 - c. What does x represent?
2. The expression $2(21x + 75)$ represents the monthly tuition and the one-time materials fee that Jaime pays for his two children to join a science club. What do each of the following represent, in context, for the above expression?
 - a. 2
 - b. x
 - c. $21x$
 - d. 75
 - e. $21x + 75$

3. Find the area of each rectangle shown below.



4. Simplify the expressions below.
 - a. $(y^3)^2 y^4$
 - b. $(z^{-3})^{-2} z^3$
5. If the expression $\frac{3^a \cdot 2\sqrt{9}}{27 \cdot \sqrt{4}}$ is equal to 1, what is the value of a ?
6. If the expression $\frac{3^d \cdot \sqrt{5}}{3^2 \cdot \sqrt{45}}$ is equal to 3, what is the value of d ?
7. Re-write each expression using radicals.
 - a. $7x^{\frac{1}{2}}$
 - b. $(g^3)^{\frac{1}{5}}$
 - c. $x^{\frac{a}{b}}$

8. Re-write each expression using rational exponents.

a. $\sqrt{7y^3}$

b. $\sqrt[3]{k^5}$

c. $\sqrt[c]{p^a}$

9. Of the terms real, rational, irrational, integer, and whole number, list all that can be used to describe the value of the expressions below. Explain your answer.

a. $\frac{1}{4} + \sqrt{3}$

b. $\sqrt{16} - \frac{3}{5}$

c. $23 - \sqrt{259}$

d. $\sqrt{\frac{49}{81}} + \frac{2}{9}$

10. Solve the equations below.

a. $2(t + 4) = 7 + 5(t - 4)$

b. $5(4w - 2) = 8 + 2(w - 6) + 12$

11. Write an algebraic proof for the following:

a. Given: $\frac{2}{7}x + 6 = 10$, prove: $x = 14$.

b. Given: $8x - 61 = 17$, prove: $x = \frac{39}{4}$.

c. Given: $4(3x - 8) = 52$, prove: $x = 7$.

12. Teddy has 23 boxes of juice packed and plans to pack 3 additional boxes each hour. Charley has 7 boxes packed and plans to pack 5 additional boxes each hour. The equation below represents when Teddy and Charley will have packed the same number of boxes, based on x number of hours.

$$23 + 3x = 5x + 7$$

After how many hours will Charley have packed the same number of boxes of juice as Teddy?

13. A copy center offers its customers two different pricing plans for black and white photocopies of 8.5 in. by 11 in. pages. Customers can either pay \$0.08 per page or pay \$7.50 for a discount card that lowers the cost to \$0.05 per page. Write and solve an equation to find the number of photocopies for which the cost of the two plans is the same.

14. There are a total of 36 cards in Aleera's collection. The number of baseball cards is 6 less than twice the number of football cards. The equation below represents the situation, where x represents the number of football cards.

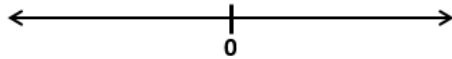
$$x + (2x - 6) = 36$$

How many baseball cards does Aleera have?

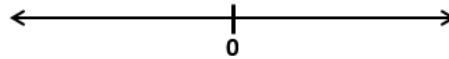
15. The perimeter of a triangle is 84 meters. The longest side of the triangle is 7 meters less than twice the length of the shortest side, x . The middle side is 7 meters longer than the shortest side. What is the length of each side of the triangle?

16. Solve each inequality and graph its solution set.

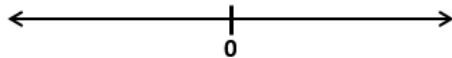
a. $q + \frac{1}{3} > \frac{1}{2}$



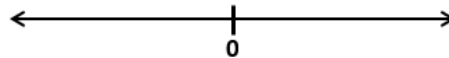
d. $\frac{1}{5}x \geq -2$



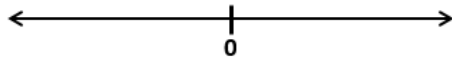
b. $17 \geq x - 9$



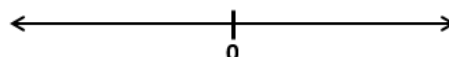
e. $4x < -6$



c. $-3x \leq -9$



f. $x + 12 - 2(x - 22) > 0$



17. Millie needs the average height of the plants she is buying to be at least 73 inches. She has selected three plants that are 70, 71, and 72 inches tall. Write and solve an inequality that Millie could use to determine the possible heights of her fourth plant.

18. Mrs. Hawk assigns her students an average of no more than 15 questions on each assignment. On their first 5 assignments Mrs. Hawk's students had 11, 10, 13, 14, and 14 questions. Write and solve an inequality that Mrs. Hawk can use to determine the number of questions she can have on the sixth assignment.

19. Solve each equation for the specified variable.

a. $a - q = a + sx$ for x

b. $kx - bf = \frac{fy}{m}$ for y

c. $a - q = a + sx$ for q

d. $kx - bf = \frac{fy}{m}$ for m

20. The graph of the equation $Ax + 3y = 48$ passes through the point $(-3, 14)$. What value of A accurately completes the equation?

21. The graph of the equation $2x + Dy = 13$ passes through the point $(-18, 7)$. What value of D accurately completes the equation?

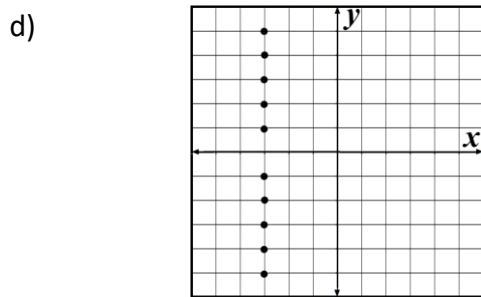
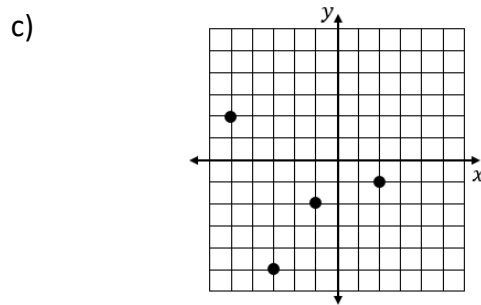
22. Explain why each relation below is or is not a function.

a)

x	-4	-9	-4	8
y	2	-5	12	-8

b)

x	1	3	7	15
y	15	7	3	1



23. A taxi company charges passengers \$1.00 for a ride, and an additional \$0.30 for each mile traveled. The function rule $C(m) = 0.3m + 1$ describes the relationship between the number of miles m and the total cost of the ride C . If the taxi company charges you \$13.00 how far did you travel?

24. A gym charges its members a one-time \$10.00 sign-up fee, and \$25 per month. The function rule $f(x) = 25x + 10$ describes the relationship between the number of months x , and the total cost of membership $f(x)$. If a gym member paid \$185.00 how many months did the gym member pay for?

25. Simplify each expression.

- $(3x^3 + 2x^2 - 3x - 2) + (x^2 + 5x - 6)$
- $(12y^2 + 5y - 6) - (9x^2 - 3x - 4) + 11$
- $(2k - 5)(3k + 6)$
- $(6m - 2)(2m^2 - 3m + 2)$

26. Given $f(x) = 3x + 5$ and $g(x) = -8x - 10$,

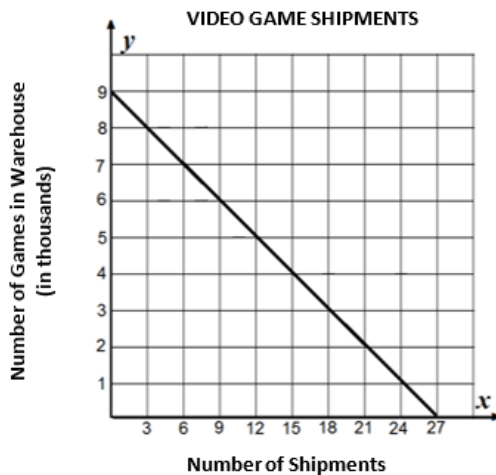
- Find $f(x) + g(x)$
- Find $f(x) - g(x)$
- Find $f(x) \cdot g(x)$
- Find $f(x) \div g(x)$
- Determine which of the above are polynomials.

27. Jim uses the function $f(x) = 0.7x + 23$ to determine the amount he charges for each used drone he sells, where x is the original value of the drone. The function $g(x) = 1.08x$ is used to determine the amount a customer pays for a drone at Jim's store including 8% sales tax. Write a function to determine the total amount a customer pays for a used drone at Jim's store including 8% sales tax.

28. Given $f(x) = 3x + 2$ and $g(x) = 2x^2$, find the following composite functions:

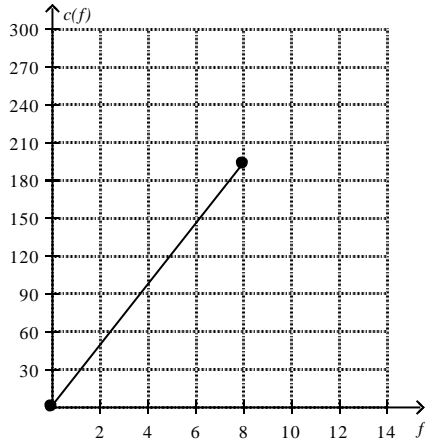
- $(g \circ f)(3)$
- $(f \circ g)(x)$

29. Elias ships a popular video game to stores around the country. The graph below shows the number of games Elias has left in his warehouse and the number of shipments he has made.



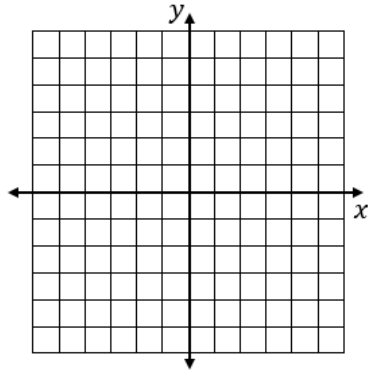
- What does the x -intercept of the graph above represent in this situation?
- What does the y -intercept of the graph above represent in this situation?
- What does the slope of the graph above represent in this situation?
- What are the domain and range?

30. You have 8 cups of flour. It takes 1 cup of flour to make 24 cookies. The function $c(f) = 24f$ represents the number of cookies, c , that can be made with f cups of flour.

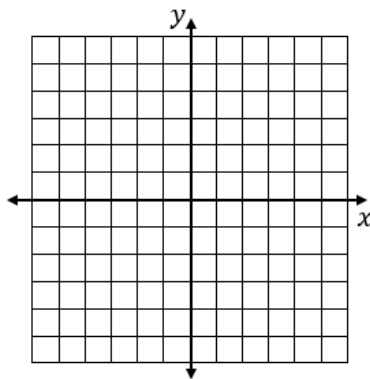


What domain and range are reasonable for the function?

31. Translate the graph of the equation $y = \frac{5}{2}x + 2$ to the left 4 units. Graph the translation.



32. Translate the graph of the equation $y = 2x - 3$ up 3 units. Graph the translation.



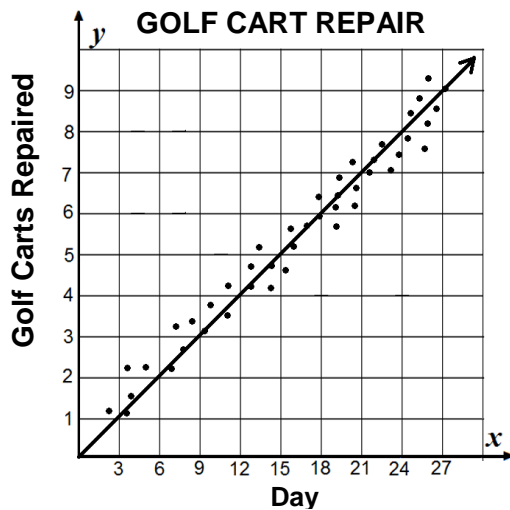
33. Write the rule for the n^{th} term of each sequence.

- a. 7, 4, 1, -2, ...
- b. -11, -3, 5, 13, ...

34. Jarek buys jerseys for his team online. He pays a constant shipping price plus a special rate for each jersey. During the spring season Jarek paid \$151 for 24 jerseys. In the summer season he paid \$79 for 12 jerseys. What is the special rate Jarek pays for each jersey and how much does he pay for shipping?

35. Mr. Cringle found a box of handmade holiday greeting cards in his garage and decided to make more to send to all his friends. After 2 hours had passed, Mr. Cringle had a total of 30 cards. After 6 hours had passed, he had a total of 40 cards. At what rate is Mr. Cringle making greeting cards and how many cards were in the box he found?

36. The scatter plot below shows the linear trend of the number of golf carts a company repaired in the month of February and a line of best fit representing this trend.



- Write the equation that models the number of golf carts repaired as a function of the number of days in the month of February.
- What is the meaning of the slope as a rate of change for this line of best fit?

37. The scatter plot below shows the linear trend of the number of golf carts a company sold in the month of February and a line of best fit representing this trend.



- a. Write the equation that models the number of golf carts sold as a function of the number of days in the month of February.
 - b. What is the meaning of the slope as a rate of change for this line of best fit?
38. Solve the systems of equations below.
- a.
$$\begin{cases} 2x + 5y = 20 \\ 6x + 15y = 15 \end{cases}$$
 - b.
$$\begin{cases} 9x + 18y = 6 \\ 12x + 24y = 8 \end{cases}$$
 - c.
$$\begin{cases} 5x + 4y = 6 \\ 6x + y = 13 \end{cases}$$
39. Chapman's brickyard sells bricks and blocks. A brick costs \$0.38 and a block costs \$1.56. The brickyard filled a \$24.80 order, which contained 28 items.
- a. Write a system of equations that can be used to find the number of bricks and blocks in the order.
 - b. How many blocks were in the order?
40. The ballpark made a total of \$15,000 from ticket sales at Wednesday's game. The ballpark charges \$20 for each adult ticket and \$10 for each child's ticket. They sold 3 times as many children's tickets as adult tickets.
- a. Write a system of equations that can be used to determine the number of adult and child tickets sold.
 - b. How many adult and child tickets were sold?

41. Paws at Play made a total of \$1,234 grooming 22 dogs. Paws at Play charges \$43 to groom each small dog and \$75 for each large dog.
- Write a system of equations that can be used to determine the number of small and large dogs that were groomed.
 - How many large dogs did Paws at Play groom?

42. You decide to market your own custom computer software. You must invest \$3,255 for computer hardware, and spend \$2.90 to buy and package each disk. If each program sells for \$13.75, write a system of equations and determine how many copies you must sell to break even.

43. Write an equation that is equivalent to each of the equations below.

a. $2x + 3y = 4$

c. $5x + 4y = 20$

b. $x - 7y = 8$

d. $12x + 3y = 1$

44. Graph the inequalities below to show their solutions.

a. $7x + 6y > 30$

c. $3x + 7y < 14$

b. $9x + 4y \geq 28$

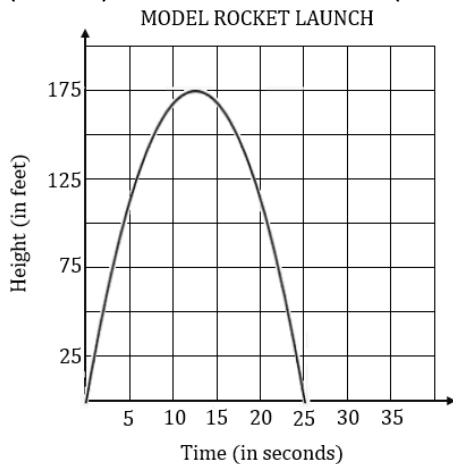
d. $7x + 14y \leq 3$

45. Graph the solutions of the following systems of inequalities.

a.
$$\begin{cases} -5x - 4y \leq 6 \\ 2(4x - 8y) > 24 \end{cases}$$

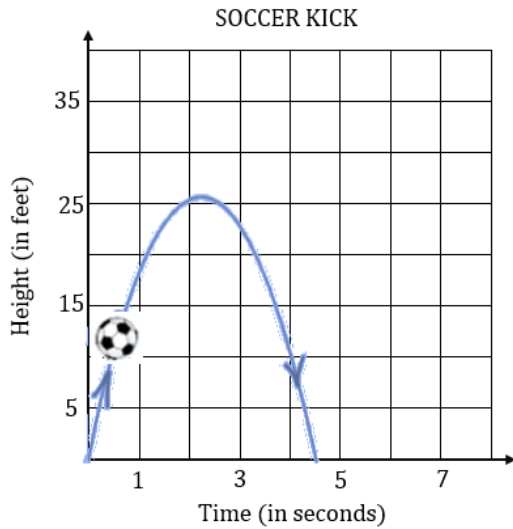
b.
$$\begin{cases} x + y > 1 \\ 5x + 2y < 10 \end{cases}$$

46. Matt and his best friend Eric launched a rocket and then graphed the height of the rocket (in feet) as a function of time (in seconds) as shown.



- What was the height of the rocket at its highest point?
- About how many seconds did it take for the rocket to fall to the ground?

47. Hope Solo kicked the soccer ball towards midfield. A graph of the height (in feet) and time (in seconds) that the ball traveled is shown.



- a. About how many seconds was the ball in flight?
b. What is the maximum height the ball reached?
48. A rectangle has an area of $x^2 + x - 6$ and a width of $x - 2$. What is the length of the rectangle?
49. A parallelogram with a height of $2x + 3$ has an area of $2x^2 + 13x + 15$. What is the length of the base of the parallelogram?
50. Solve the quadratic equations below.
- | | |
|---------------------------|------------------------|
| a. $3x^2 + 22x + 35 = 0$ | d. $x^2 - 6x - 27 = 0$ |
| b. $x^2 - x = 35$ | e. $45x^2 - 20 = 0$ |
| c. $2x^3 + 4x^2 + 2x = 0$ | f. $5x^3 - 20x = 0$ |
51. Factor each expression.
- a. $3x^2 - 6x - 24$
b. $4x^2 - 9$
c. $7x^2 + 9x + 2$
52. Find the approximate solutions to the equations below.
- a. $7x^2 - 14 = 0$
b. $x^2 - 13 = 0$

53. Write each function in vertex form.

a. $f(x) = 7x^2 + 14x + 30$

b. $f(x) = x^2 - 6x - 28$

54. Solve each equation below by completing the square.

a. $x^2 + 4x - 5 = 0$

b. $4x^2 + 8x - 48 = 0$

c. $x^2 + 12x = 9$

55. Solve each equation using the quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

a. $x^2 + 3x + 2 = 0$

b. $4x^2 + 8x - 24 = 0$

c. $6x^2 + 27x + 30 = 0$

d. $x^2 + 14x + 33 = 0$

56. Identify the vertex, axis of symmetry, and the minimum or maximum value for each equation.

a. $y = 2x^2 - 8x + 39$

b. $y = x^2 + 12x + 40$